

Newsletter

Volume 14, Number 1
January - February 1997

Director's Note

In January, I spent two weeks in Chile, attending the Second Southern Connection Congress in Valdivia, working with graduate students at remote streams in the Puerto Montt area, and evaluating a forest site in Tierra del Fuego. One of the Chilean scientists with whom I collaborate is Dr. Juan Armesto, an ecologist at the Universidad de Chile in Santiago and an IES adjunct associate scientist.

I consider myself extremely fortunate to be able to do ecosystem research at sites around the world. It is a privilege to collaborate with scientists on their home soil.

It is equally exciting when scientists from other nations come to Millbrook to do their work at our field sites and in our laboratories, and to collaborate with our scientists. Some of these visitors are profiled in this issue of the newsletter.

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The International Appeal of IES

On a display in the IES Plant Science Building is a map showing places around the world where ecologists from the Institute of Ecosystem Studies work with their scientific colleagues, do field research and collaborate on ecology education programs. The collaboration works in reverse as well: scientists from other countries come to the Institute to work with ecologists here. In past issues of the IES NEWSLETTER, the work of scientists who have traveled here from Canada, Chile, France, Haiti, Israel, Norway and South Africa has been featured.

As the Institute gains international prestige, the numbers of visitors from abroad are increasing. Some come for only a few weeks, to write up research findings with an IES colleague or to develop new collaborative projects. Others come for longer periods, to share their expertise and to learn new techniques that they can bring to research and science education programs in their home countries. The Institute is currently hosting a number of scientists from abroad, four of whom are here for a year or more. Two will be profiled here, and two in the next issue.

Ecological Implications of the Photodegradation of Dissolved Organic Carbon

Dr. Isabel Reche, an ecologist from the University of Granada in Spain, is at the Institute on a two-year post-doctoral fellowship funded by Spain's Ministry of Education. She did her doctoral research in high mountain lakes, studying interactions among zooplankton, bacteria and phytoplankton. While doing this research, she read scientific papers about the work at IES, especially that of Drs. Michael Pace and Jonathan Cole. She contacted Dr. Pace about doing post-doctoral research here, and also spoke with Dr. Dolors Vaqué at the Institut de Ciències del Mar in Barcelona; Dr. Vaqué recently had completed two years of post-

doctoral research at IES on zooplankton communities. Dr. Reche arrived at the Institute in September 1995.

Refractory organic carbon — the most important sunlight-absorbing compound in water — can affect lake ecosystems in two ways. First, it controls how much light can enter into the water column and, thus, the photosynthetic potential of the lake. Second, the absorption of the sun's energy by these refractory compounds leads to their degradation and makes the carbon available for bacterial photosynthesis. Dr. Reche is investigating factors that control the "photobleaching" of organic molecules.



Dr. Isabel Reche is doing a cross-system study of 30 lakes. One of these is Upton Lake in the Town of Stanford, New York.

MOLLY AHEARN

She is researching the effects of sunlight on organic matter degradation in two ways. First, she is doing a cross-system study of 30 lakes. Most of the lakes are in Wisconsin where she spent last summer at the University of Notre Dame Environmental Research Center, but several are in Connecticut and New York. At these sites she studies how the surrounding watershed and soil affect the input of organic matter to the lake, and how the water chemistry

makes molecular degradation by ultraviolet light easy or difficult.

Second, she is studying one lake for a full year. Two or three times a month she and research assistant Dave Thomas collect water from Old Man McMullen Pond, near Canaan, Conn., to see how seasonal changes affect water color and photodegradation and to measure the bacterial response. Photodegradation is dependent upon the season, occurring much more rapidly in summer when the sunlight has more energy. Because refractory organic matter has color, increased photodegradation leads to clearer water. (The effect, however, can be balanced out with summer rains, which wash organic matter into the water thereby causing it to lose clarity.)

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Research, Education, Policy: Dr. Pouyat Meets His Goals

When he began his career, ecologist Dr. Richard Pouyat had four major goals. He tackled three of these during his nine years at IES, first as a graduate student, then as a post-doctoral associate and finally as a visiting scientist. This year, as a legislative assistant in Washington, D.C., he will focus on the fourth.

Goal: Help shape environmental policy

Dr. Pouyat has long been interested in how policy is made in environmental and natural resource issues. Using his scientific training and experience to help pass sound legislation in these areas is something he has always wanted to do. Now, as a recipient of a Congressional Science Fellowship, he will have the opportunity to pursue this goal: working with New York Senator Daniel Patrick Moynihan, Senior Democrat on the Senate Environment and Public Works Committee, he will be helping with 1997 environmental legislation.

The one-year Congressional Science Fellowships are administered by the American Association for the Advancement of Science and co-sponsored by a number of other organizations. Dr. Pouyat's fellowship is supported by the Ecological Society of America, the American Institute of Biological Sciences and the Society for Conservation Biology. He is one of only a few ecologists who have had the opportunity to shape environmental policy in this way. Dr. Pouyat considers himself very fortunate to have this opportunity, adding, "There is no way my selection as a Congressional Science Fellow would have been possible without the scientific training I received at IES."

Goal: Increase interaction between scientists and managers

In the mid-1980s, Dr. Pouyat was conducting a natural resources inventory of New York City parks when he met Dr. Mark McDonnell. Dr. McDonnell — now the director of the Bartlett Arboretum in Stamford, Connecticut — was the IES ecologist who first directed The New York Botanical Garden Forest Project. After completing the inventory, both ecologists were surprised that over 5,000 acres of woodlands were "discovered" in New York City. These urban woodlands are not residential plantings but real forests dominated by trees, an understory and a forest floor. An urban environment, however, can be a stressful one for forests, which of course evolved under totally different conditions, and Dr. Pouyat was

struck by the question, "Given the change in environmental conditions, what will happen to these forests if there is no management intervention?" In 1987, at Dr. McDonnell's urging, he enrolled in the Rutgers University graduate program to study this issue.

Under a cooperative agreement with the U.S. Department of Agriculture Forest Service's Northeastern Forest Experimental Station, he came to the Institute to do his doctoral research: the Institute provided the academic environment and staff support while the Forest Service provided salary and research funding. Dr. McDonnell and an IES colleague, Dr. Steward Pickett, were developing a new long-term research program, the Urban-to-Rural Gradient Ecology project (URGE). URGE ecologists study the effects of human-accelerated environmental changes by examining ecosystems along a gradient of decreasing human activity and impact from urban to rural sites.

This research was important for three reasons. First, park officials need to know how to manage forests in urban and suburban areas. Second, by understanding how an urban environment affects forests, scientists and managers can predict what will happen to a rural forest as development encroaches. And, finally, from a basic research point of view, comparing urban to non-urban forests provides the opportunity to assess the effects of stress on forest ecosystems. Stresses in an urban environment include air pollution, the introduction of non-native plant and animal species that can crowd out native species, and human-caused disturbance such as fires set deliberately — a problem in some city parklands.

In the urban stands, Dr. Pouyat found accumulations of heavy metals in forest soils, a decrease in fungi and soil invertebrates — mites, nematodes, springtails — and an increase in the populations of Asian and European species of earthworms. (In rural soils, Dr. Pouyat notes, there are relatively few earthworms and it is not yet known why the opposite is true in urban soils. It appears, however, that the net decomposition of leaf litter is basically the same, even with these contrasting soil environments, but only when the exotic worms are present in the urban stands. Without worms, these



MOLLY AHEARN

Dr. Richard Pouyat set up microcosms in the controlled temperature and moisture conditions at the Institute's rearing facility to learn how earthworms affect nutrient cycling in urban and rural soils.

stands have lower rates of decomposition.)

Following Dr. Pouyat's graduate work, the Forest Service extended its support of his research by awarding him a post-doctoral fellowship through its Northern Global Change Program. He continued his research at IES, comparing urban and rural soils in collaboration with IES ecologists Drs. Patrick Bohlen, Peter Groffman and Gary Lovett.

Goal: Increase interaction between scientists and environmental educators

There are 1.2 million children in New York City public schools, presenting a tremendous opportunity for opening young minds to ecology and the environment. With his years of experience with New York City's parklands and his proximity to Institute of Ecosystem Studies' ecology educators, Dr. Pouyat was in place to pursue another of his goals, environmental education. The U.S. Forest Service, which promotes parks as educational resources, strongly supported Dr. Pouyat's endeavors in this area.

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Research, Education, Policy, *from page 2*

Working with IES educators, Dr. Pouyat began this new aspect of his career by leading Eco-Inquiry workshops for city teachers. (Eco-Inquiry is the science curriculum developed by IES educational resource and development specialist Ms. Kass Hogan and now in use nationwide.) Then, last summer, he worked with a group of junior high school students from Manhattan public schools on a nitrogen deposition study. In this collaborative project between the Forest Service, Dr. Margaret Carreiro at the Calder Ecology Center and Dr. Lovett, with research assistant Mike Traynor, at IES, students working with the New York City Parks' Urban Forest and Education Program collected throughfall — rainwater that drips through the forest canopy — along an urban-to-rural gradient. Their findings after chemical analysis were dramatic: a five- to seven-fold increase in the amount of nitrogen deposition in the samples from urban forests.

Goal: Increase scientific interaction on a community level

For two days each week during 1996, Dr. Pouyat broadened his horizons, and those of many others, in the course of meeting another career goal. He brought science to community groups in New York City, doing youth education and training for environmental jobs and coordinating neighborhood green-up projects. He also helped with urban revitalization projects in the South Bronx, providing practical advice on soils, how to plant trees and so forth. This community work was under the auspices of the Urban Resources Partnership, a partnership of seven federal agencies that brings technical expertise and resources to urban areas.

Whenever Dr. Pouyat works in New York City, he is very impressed by the commitment he finds. "These communities are taking the initiative to improve their

quality of life," he explains. "We have been there as a resource, but the impetus has been coming from them." He adds, "This community work has been a very rewarding experience. Members of the community not only are getting the technical expertise they need to improve their neighborhood, but also, by my taking an interest in their lives, they — the kids and the adults — have taken an interest in my life as a scientist."

In meeting the challenges posed by his career goals, Dr. Pouyat has amassed a wealth of knowledge and expertise about both the natural and the human environment. Now, for the next year in Washington, he has the opportunity to apply this experience to help shape our future.

International Appeal, *from page 1*

Vegetation Studies Have Economic Applications

The province of Shanxi, China is mountainous with a cool, dry climate. Erosion and water loss are problems to the region, and management of the land through improved vegetation will have a positive impact on farming. Dr. Jin-Tun Zhang, a plant ecologist at Shanxi University, is another researcher who learned about the Institute from reading scientific journals. He was particularly interested in the work of fellow plant ecologist Dr.

Steward Pickett. They corresponded, and he received an invitation from Dr. Likens to spend a year at the Institute. His stay here is funded by a National Education Committee Fellowship from the Chinese Government.

Dr. Zhang is doing vegetation studies as part of the Institute's Urban-to-Rural Gradient Ecosystem study (URGE) (see the article on Dr. Pouyat's research on page 2), and is also doing a vegetation analysis based on oldfield succession data collected by Dr. Pickett and his graduate

student Ms. Mary Cadenasso. One of Dr. Zhang's goals is to improve the vegetation and the local economy of Shanxi Province, and he wants to base the selection of plants on sound ecological principles. Because there are many genera common to both our region and his — for example *Quercus* (oak), *Populus* (poplars) and pines — and because forest structure is similar in the two regions, Dr. Zhang expects that he will be able to apply much of what he has learned from IES gradient and succession studies to his ongoing work.

As their stays at IES draw to a close, Drs. Reche and Zhang will be writing up their findings for publication in the scientific literature. These papers, and those published by our other visiting investigators and resident scientists alike, may well provide inspiration for the next round of international visitors to IES.



Dr. Jin-Tun Zhang is doing vegetation analysis of data from IES research sites, including the Hutcheson Memorial Forest in Franklin Township, New Jersey. These data represent the longest continuous record of post-agricultural oldfield vegetation change in North America.

Spring Aquatic Ecology Camp at IES

April 1 - 4

Girls and boys in grades 4 - 6 will hike, study aquatic plants and animals, do experiments and make nature art projects.

Call 677-5359 by March 21 to register.



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Calendar

CONTINUING EDUCATION

For Winter/Spring 1997 catalogues and program information, call the Continuing Education office at 914/677-9643. Programs during March and April include:

Landscape Design

Mar. 5 (7 sessions): **Graphics II**
Mar. 11 (8): **Landscape Design III**
Mar. 17 (6): **Construction I**
Mar. 22: **Walks and Steps**
Apr. 12: **Ecological Alternatives to Lawns**
Apr. 12: **Contour Plans**

Gardening

Mar. 5 (6): **Comm. Greenhouse Management**
Mar. 15: **Starting from Seed**
Mar. 15: **Basic Cultural Techniques for Perennials**
Mar. 22: **Pruning Trees and Shrubs**
Apr. 3 (6): **Insect Pests & Diseases of Plants**
Apr. 5: **Introduction to Horticultural Therapy**
Apr. 12 (4): **Plants/Landscape: Woody Plants**
Apr. 13: **Water Gardens**
Apr. 16 (2): **Espalier**
Apr. 19: **Elegance for Quiet Places: Moss Gardens and Hardy Ferns**
Apr. 26: **Wildlife Habitat Management and Conservation**
Apr. 27: **Native Wildflowers/Display Garden**

Natural Science Illustration

Mar. 8: **Exploring Nature's Design**
Mar. 15 and/or 16: **Water Colors /Greenhouse**
Mar. 19-21: **Pen and Ink I: Techniques**
Mar. 22: **Charcoal Drawing in the Greenhouse**

Biology and Earth Science

Feb. 25 (8): **Basic Botany**
Apr. 17 (2): **Fly-fishing Clinic**
Apr. 19: **In Search of Cold-Blooded Wildlife: An Introduction to Amphibians and Reptiles**
Apr. 28 (4): **Plant Medicine: Common Weeds for Common Problems**

Workshops

Mar. 1: **Careers in Horticulture/Garden Communication**
Mar. 22: **Planting Design for Ponds and Other Wetlands**
Apr. 5: **Elegant Ground Covers and Vines**

Flower Shows

Mar. 10: **New England Flower Show**

SUNDAY ECOLOGY PROGRAMS

Free public programs are held on the first or second Sunday of the month. Call 914/677-5359 to confirm the day's topic or, in case of poor weather, to learn the status of the day's program.
Mar. 9: **Maple Sugar Ecology for Families**, led by IES educator Tom Moorcroft ... *There is a limit of 30 participants, so RESERVATIONS ARE REQUIRED: Call 914/677-5359, Mon. - Fri.*
Apr. 6: **Groundwater Mysteries**, led by IES educator Martha Cheo

IES SEMINARS

Free scientific seminars are held each Friday at 3:30 p.m. at the IES Auditorium:
Mar. 7: Topic: **Dissolved organic carbon and nitrogen saturation**. Dr. William McDowell, U. of New Hampshire
Mar. 14: **The Fate of Watershed-Derived Nitrogen in Estuaries: An Isotopic Tracer Investigation**. Dr. Robert Max Holmes, Ecosystems Center, Marine Biological Laboratory, Massachusetts
Mar. 21: **Biotic Controls on Soil Carbon and Nitrogen Dynamics in Alpine Tundra**. Dr. Tim Seastedt, Inst. of Arctic and Alpine Research, U. of Colorado at Boulder
Apr. 4: **Dynamics of the Serengeti Ecosystem and Its Conservation**. Dr. A.R.E. Sinclair, Centre for Biodiversity Research, U. of British Columbia
Apr. 7 (Monday): To be announced. Dr. Walter Whitford, Environmental Protection Agency, Nev.
Apr. 18: To be announced. Dr. Sybil Seitzinger.
Apr. 25: **Spatial Projections of Potential Habitat and Populations of the Gray Wolf and Implications for Overall Forest Productivity**. Dr. David J. Mladenoff, Dept. of Forestry, U. of Wisconsin

VOLUNTEER OPPORTUNITIES

For information on volunteering at IES, call Ms. Su Marcy at 914/677-5359.

GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 3:30 p.m. daily except public holidays. Admission is by free permit (see "HOURS").

HOURS

Winter hours: **October 1 - April 30**
Closed on public holidays.

Public attractions are open Mon. - Sat., 9 a.m.-4 p.m. & Sun. 1-4 p.m., with a free permit*. The IES Ecology Shop is open Mon.- Fri., 11 a.m.-4 p.m., Sat. 9 a.m.-4 p.m. & Sun. 1-4 p.m. (The shop is closed weekdays from 1-1:30 p.m.)

* Free permits are required for visitors and are available at the IES Ecology Shop or the Education Program office daily until 3 p.m.

IES ECOLOGY SHOP

New in the Shop ... Guide books, including *New York Off the Beaten Path: A Guide to Unique Places*, and field guides ... butterfly mugs ... **for children** ... new puzzles and puppets ... **and in the Plant Room** ... cyclamen ... ivy topiaries
Senior Citizens Days: 10% off on Wednesdays
March 10 - 17: "Green" specials

•• Gift Certificates are available ••

MEMBERSHIP

Join the Institute of Ecosystem Studies. Call Ms. Janice Claiborne at 914/677-5343 for information.

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